

described and claimed herein to provide an apparatus that reduces the temperature of the dryer drum breech plate. It is a further advantage of the preferred embodiments of the invention described and claimed herein to provide an apparatus that eliminates the need for adjustable spin vanes in order to achieve a desired flame configuration. It is another advantage of the preferred embodiments of the invention described and claimed herein to provide an apparatus having improved aerodynamics which reduce energy consumption and body pressure and produce a more free flowing burner assembly. It is still another advantage of the preferred embodiments of the invention described and claimed herein to provide an apparatus which produces reduced noise levels during operation. It is yet another advantage of the preferred embodiments of the invention described and claimed herein to provide an apparatus that is less complicated and expensive to manufacture, operate and maintain than conventional burner assemblies. It is yet another advantage of the preferred embodiments of the invention to provide an apparatus that reduces the temperatures in the area of the burner flame and the resulting damage to components in the area of the burner flame. It is also an advantage of the preferred embodiments of the invention to provide an apparatus that reduces the exposure to debris produced in the combustion chamber experienced by components in the area of the burner flame.

**[0006]** Additional advantages of the preferred embodiments of the invention will become apparent from an examination of the drawings and the ensuing description.

#### EXPLANATION OF TECHNICAL TERMS

**[0007]** As used herein, the term “mounted about the periphery of the housing” means that the at least one pre-mix gas injection nozzle is mounted within the interior of the housing of the burner assembly such that the nozzles do not extend to center of housing. More particularly, the term “mounted about the periphery of the housing” means that the at least one pre-mix gas injection nozzle is mounted within the interior of the housing of the burner assembly such that the nozzles leave an open area in the center of the housing through which the primary air tube, the pilot assembly and the like may pass unimpeded.

**[0008]** As used herein, the term “centrally located in the housing” means that the pilot assembly is located and arranged in the housing of the burner assembly such that it passes through the open area in the center of the housing produced by the arrangement of the pre-mix gas injection nozzles.

#### SUMMARY OF THE INVENTION

**[0009]** The invention claimed herein comprises a burner assembly including a housing having an air inlet and a burner end, a motor, and an impeller mounted in the housing. The impeller is in fluid communication with the air inlet, in mechanical communication with the motor, and adapted to direct air from the air inlet towards the burner end of the housing. The burner assembly also includes at least one pre-mix gas injection nozzle mounted in the housing. Each of the at least one pre-mix gas injection nozzle has at least one orifice adapted to direct gaseous fuel into the housing. The burner assembly further includes a spin vane comprising at least one spin vane blade. The spin vane is mounted in the burner end of the housing and adapted to direct the flow of air in the burner end. The burner assembly still further includes

an igniter mounted in the burner end of the housing. The igniter is adapted to ignite the air and fuel mixture in the burner end of the housing to produce a main flame.

**[0010]** In a preferred embodiment, a liquid fuel system is provided in the burner assembly. In this preferred embodiment, a primary air tube is mounted within the housing. The primary air tube has an inlet end located downstream of the impeller and an outlet end located adjacent to the burner end. Also in this preferred embodiment, an atomizing nozzle is mounted on the outlet end of the primary air tube, a liquid fuel supply tube is mounted within the primary air tube so as to convey liquid fuel to the atomizing nozzle, a compressed atomizing air supply tube is mounted within the primary air tube so as to convey compressed air to the atomizing nozzle, and a ring is mounted around the periphery of the outlet end of the primary air tube. Also in a preferred embodiment of the burner assembly of the invention, a converging focusing cone and a diverging conical discharge section are mounted to the burner end, and a stabilizing gas base flame and a centrally-located pilot are provided in the burner end of the burner assembly. In another preferred embodiment of the invention, the burner assembly includes an isolation shroud at the burner end.

**[0011]** In order to facilitate an understanding of the invention, the preferred embodiments of the invention are illustrated in the drawings, and a detailed description thereof follows. It is not intended, however, that the invention be limited to the particular embodiments described or to use in connection with the apparatus illustrated herein. Various modifications and alternative embodiments such as would ordinarily occur to one skilled in the art to which the invention relates are also contemplated and included within the scope of the invention described herein.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0012]** The presently preferred embodiments of the invention are illustrated in the accompanying drawings, in which like reference numerals represent like parts throughout, and in which:

**[0013]** FIG. 1 is a perspective view of a preferred embodiment of the burner assembly in accordance with the present invention.

**[0014]** FIG. 2 is a front view of the preferred embodiment of the burner assembly illustrated in FIG. 1.

**[0015]** FIG. 3 is a rear view of the preferred embodiment of the burner assembly illustrated in FIGS. 1-2.

**[0016]** FIG. 4 is a right side view of the preferred embodiment of the burner assembly illustrated in FIGS. 1-3.

**[0017]** FIG. 5 is a left side view of the preferred embodiment of the burner assembly illustrated in FIGS. 1-4.

**[0018]** FIG. 6 is a partial sectional front view of the preferred embodiment of the burner assembly illustrated in FIGS. 1-5 taken along sectional line A-A of FIG. 4.

**[0019]** FIG. 7 is a partial sectional right side view of the preferred embodiment of the burner assembly illustrated in FIGS. 1-6 taken along sectional line B-B of FIG. 2.

**[0020]** FIG. 7A is a perspective view of a preferred embodiment of a screen in accordance with the present invention.

**[0021]** FIG. 8 is a perspective view of the preferred gas injection section of the burner assembly illustrated in FIGS. 1-7.

**[0022]** FIG. 9 is a perspective view of a first preferred embodiment of the pre-mix gas injection nozzles of the burner assembly illustrated in FIGS. 1-8.